User's manual

for monitoring, automation

and remote control module

"Mini-Monster32N"

and modifications "NF", "NW", "NFW"

v. 2.3 English

§ 1. General information

“Mini-Monster32N” is standalone module for monitoring, automation and remote control, based on microcontroller (by Atmel). The module can be connected to standard IEEE 802.3 Ethernet network. It has mini-web-server with web-interface, and works over standard TCP/IP v.4 protocol.

“Mini-Monster32N” has six port. All ports can work as logical outputs and logical inputs. The module supports digital thermometer Dallas DS18b20(+).

The module has also automatic functions: thermostat and Ethernet watchdog.

Then, functions of the Module are:

- logical level remote control on outputs;
- logical level remote monitoring on inputs;
- temperature monitoring (originally designed for Celsius grade);
- automated electric load control according to temperature (thermostat function);
- host (in TCP/IP network) accessibility monitoring;
- automated electric load control according to host accessibility (Ethernet watchdog function);
- PWM output
- SNMP temperature and inputs monitoring[1]

[1] SNMP is an optional function.

§ 2. Technical specifications of the Module

Size (W*H*D) ..... 19*20*50 mm
Vin power ..... 5-9 V DC[2]
Consumption current ..... 150 mA (5V)
Ethernet 10Based-t
Ports 6
Output Vmax 3.3V
Output Amax 20mA
Input logic 1 ..... >1.7V
Input logic 0 ..... <1.2V
Input Vmax 3.5V
Thermal sensors to connect 6
Thermal sensors type digital1
Thermal measurement range ..... -55...+125 C^O
Thermal measurement accuracy ..... 0,1 C^O
Operating temperature of the Module ..... 0...+40 C^O
Operating humidity level ..... 20%...80%

[2] In modifications “NW”,”NFW” – 5-24 V DC.

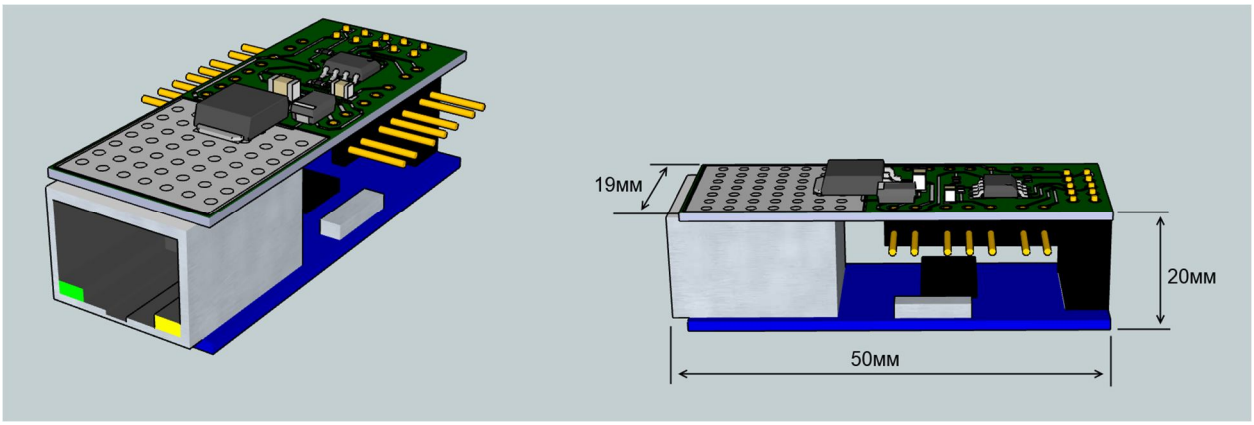
§ 2.1. Firmware type

There are few different firmware types for the MM32 because one firmware can't include all the functions of the module. You must specify the type of the firmware while ordering. The firmware is user-changeable only in Mini-Monster32N**F**. If not specified, the module will be shipped with Type1 firmware.

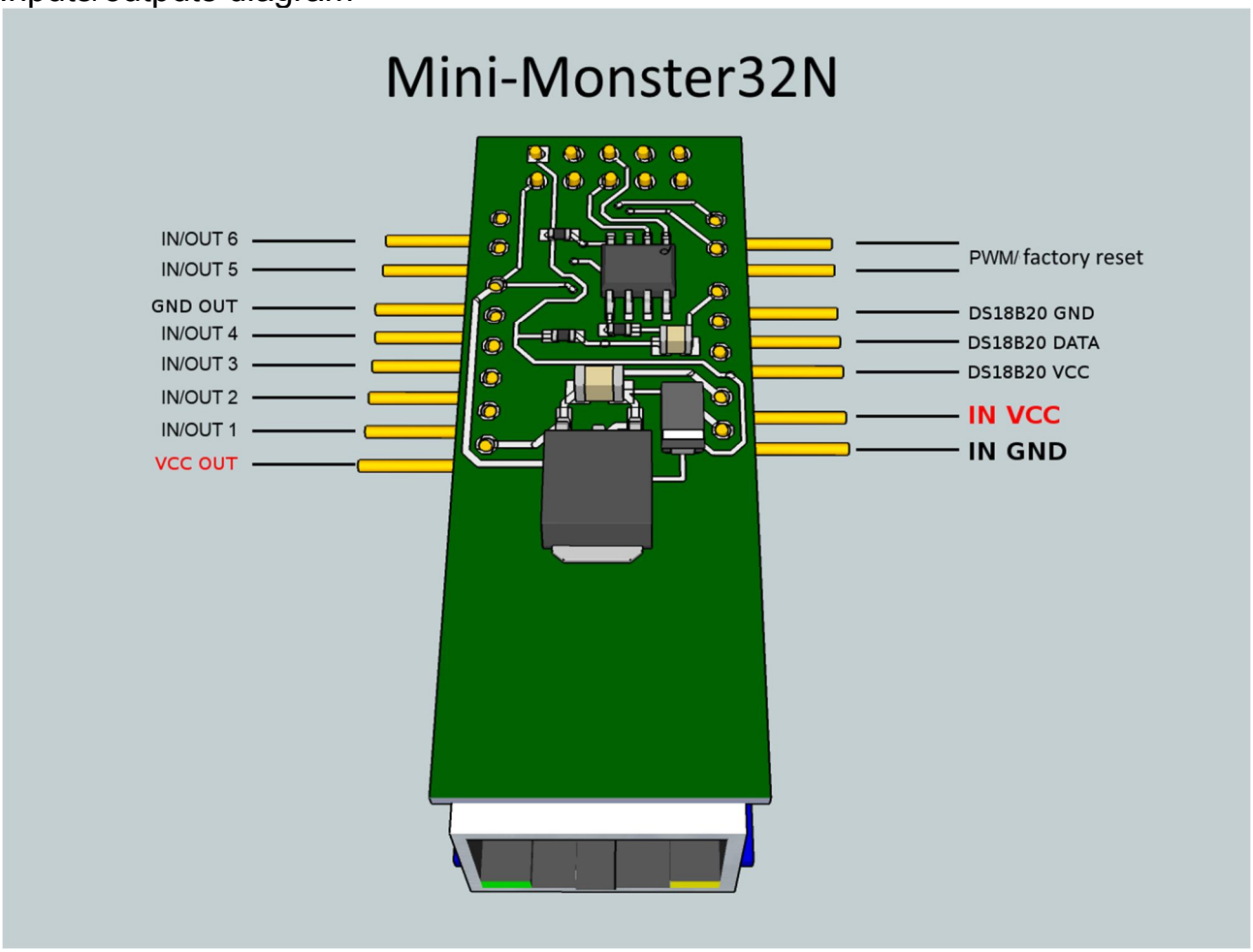
	thermo	watchdog	PWM	RESET	JSON	SNMP	TRAP
Type1	YES	YES	YES	YES	YES	NO	NO
Type2	YES	YES	NO	YES	NO	YES	NO
Type3	YES	NO	NO	NO	NO	YES	YES
Type4	NO	YES	NO	NO	NO	YES	YES

§ 3. Connection

General view

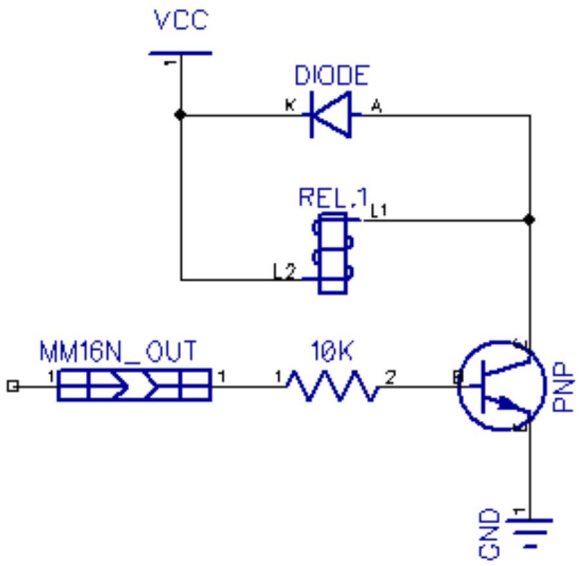


Inputs/outputs diagram



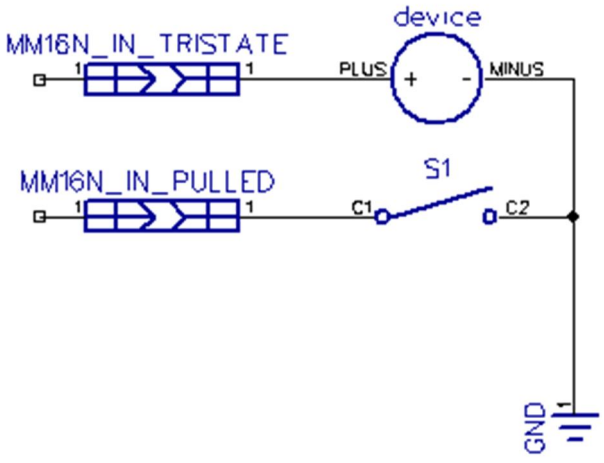
§ 3.1. Connection features

You can configure any of the universal IO ports as Input or Output (see chapter 4). **Be sure to configure all ports and save its state with "Save" button before make any connections to it.**



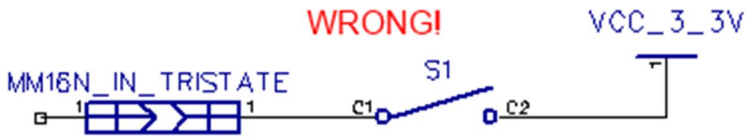
Using outputs

MM32N has 6 general purpose ports. Ports in outputs which cannot be used to drive high current loads. If you want to do so you must use some MOSFET or relay. To connect the relay to the output you must use the transistor as well. Here is simple schematics of relay connection to the one of the output. Also you can use 5V "relay-boards" with embedded transistor. There is VCC OUT and GND OUT pins on the module, so you can power such boards with those pins.



Using inputs

Ports in input state can be configured as "tri-state" inputs or as "pulled" inputs. In "tri-state" mode you can apply some V from any device which has common GND with module. In "pulled" mode the inputs is pulled to the 3.3V with internal resistor. So you can connect it to the GND with button or similar switching device. Pay attention that in both cases you must not apply the voltage higher than 3.5V to the inputs.



Pay attention that unconnected input in "tri-state" may become logical 0 or 1 randomly. So you can't use this type of connection without any pulling resistor (internal or external).

PWM

PWM output have the same parameters with regular output. You can use transistor to drive high load or connect it directly to PWM enabled devices such as 4-pin PC coolers.

Temperature sensor connection

It's possible to connect 6 (six) digital temperature sensors to the module. Maximum cable length is 50 meters. We don't recommend to use the wire with diameter less than 0.5mm in case of long cable usage.

For a more accurate measurement of the temperature it is recommended to connect the sensor with “pigtail” at least 10 cm length.

Power supply

MM32N requires DC 5-9V power supply. We recommend to use only new, branded and/or tested power supply, and avoid used, no-name or unreliable ones. Power supply's Vout must be stable and never will fall less than 5 V . Maximum output current of the power supply depends of the summary amperage requirements of all connected devices such as relays. It is very recommended to avoid voltage fallings under 5 V especially because of switching relays. Such power surges may cause unstable operation of the module.

§ 4. Web-interface and controls

The Module has web-interface, and can be accessed via TCP/IP after connecting to Ethernet and power supply.

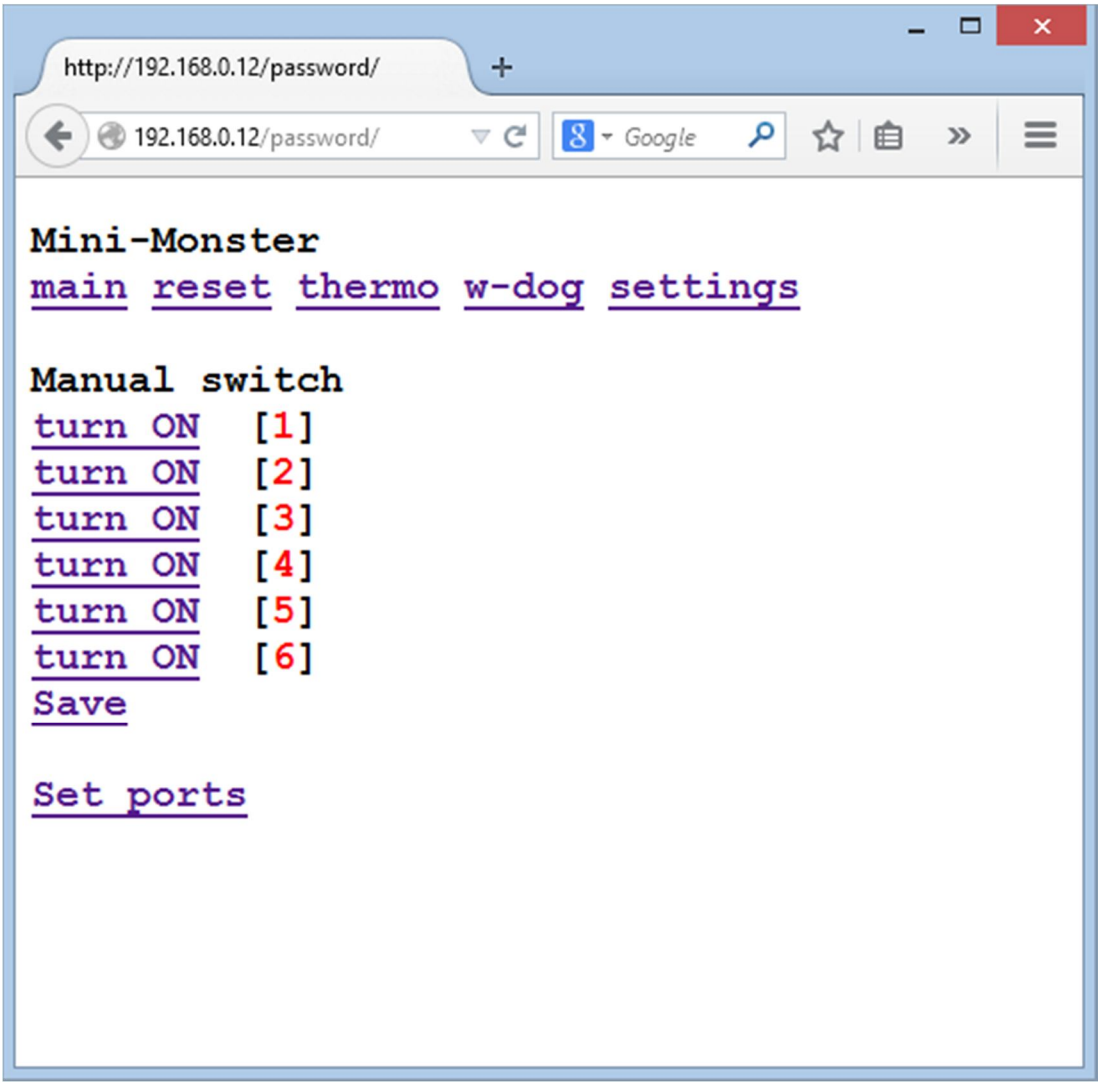
Defaults are:

IP: 192.168.0.12

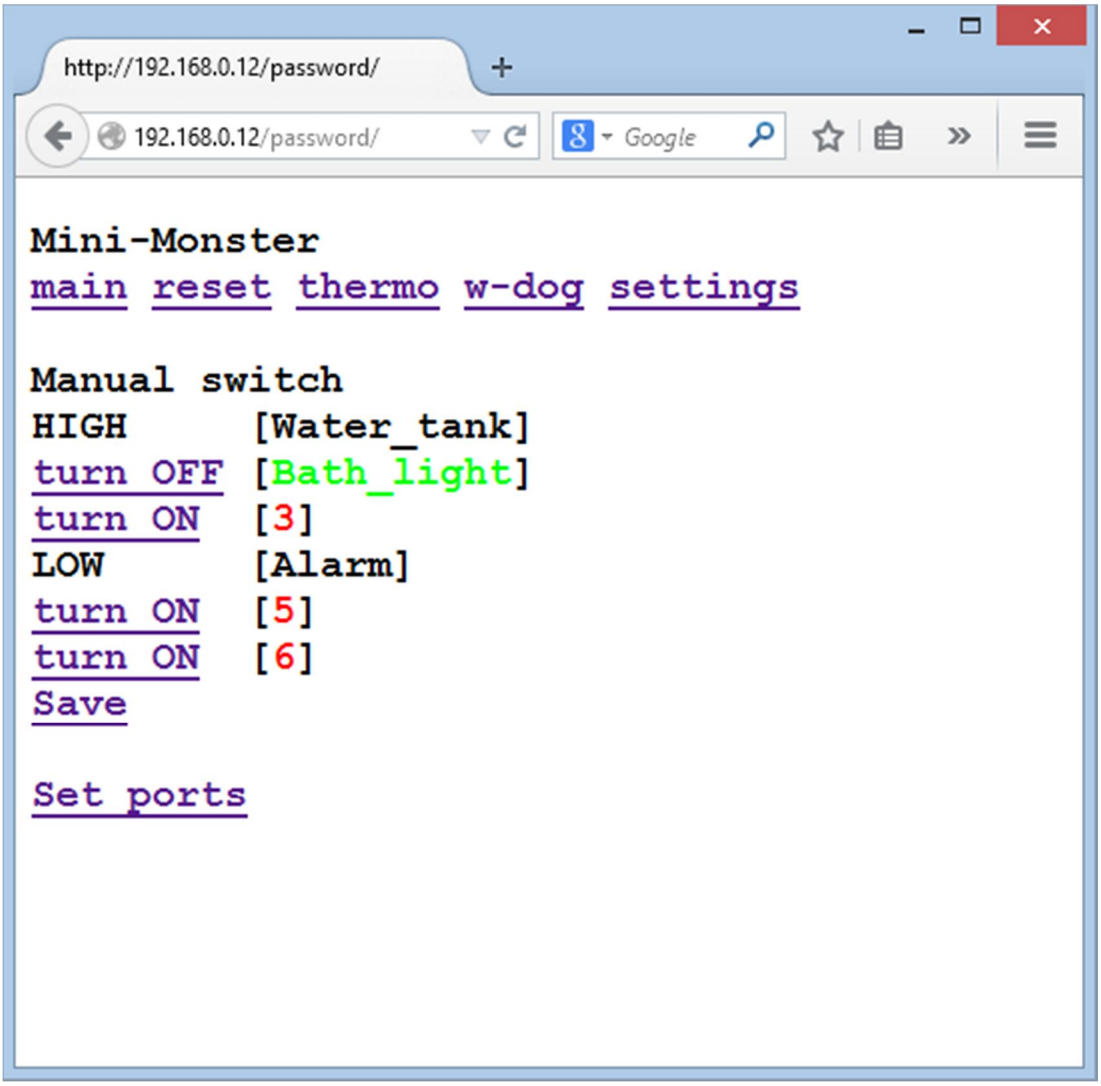
Password: password

MAC: F0-F1-09-E4-01-FF

So after first switching-on the Module can be accessed at address http://192.168.0.12/password



§ 4.1. Control sections



MAIN

Displays states of outputs/inputs and allows to switch outputs and input's modes.

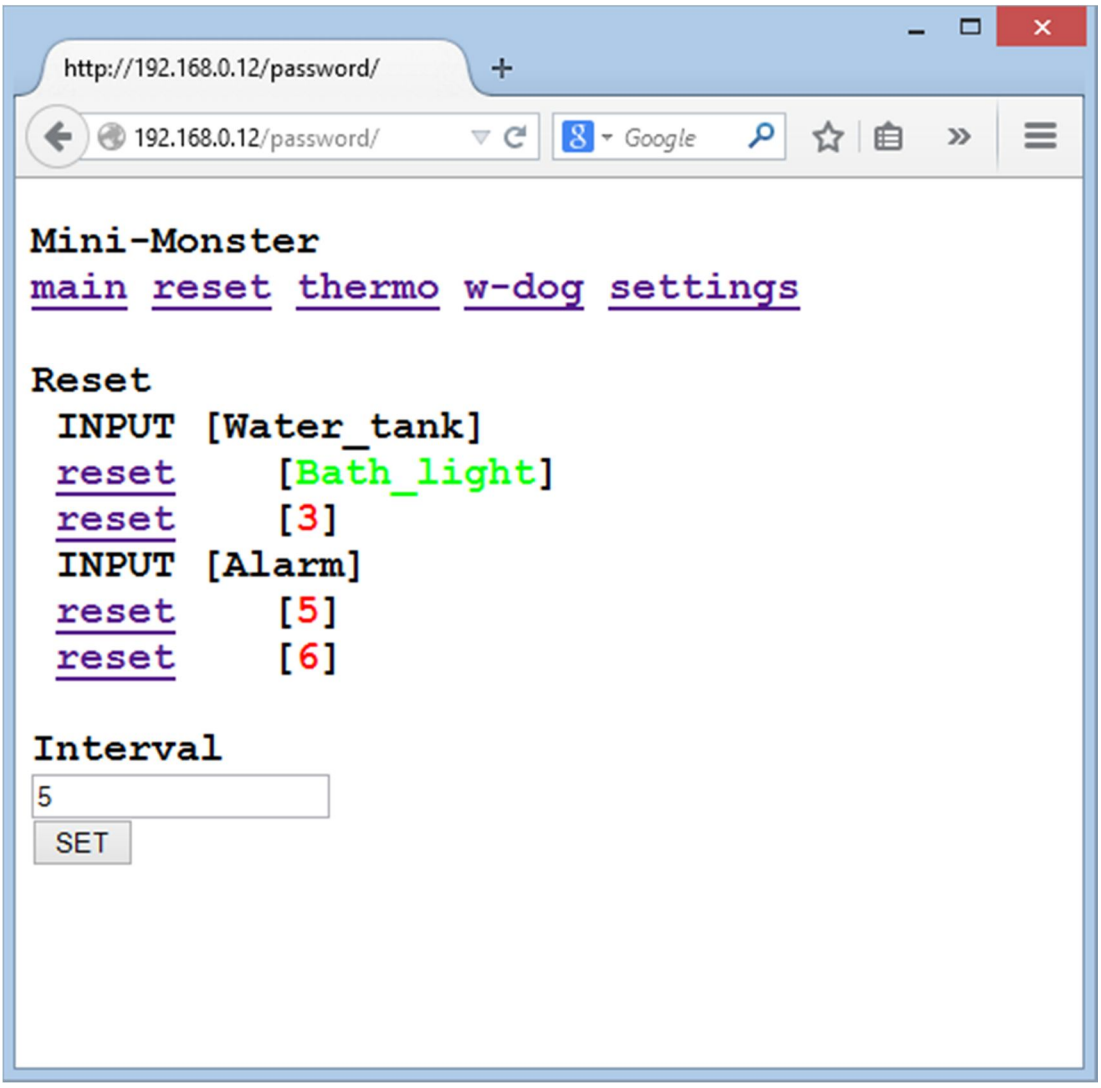
Color of port number shows port state at the moment (green - on, red - off.) if port is output.

Inputs can be configured as pulled up (to positive) or tri-state (not pulled). To switch states, use corresponding switch.

Capital letter (“H”igh or “L”ow) indicates input state at the moment.

‘‘Set ports” section allows to configure ports direction (input or output). Also here you can set port's name. Name must contain only alpha-numerical characters and can be 10 characters long maximum.

«Save» button allows to save current states of outputs (on or off) as the default state (after reset, for example, outputs will automatically be returned to a saved state).



RESET

allows to do quick double inversion of output, example ON-OFF-ON.

Interval of this operation is general for all outputs; in seconds, max 255 seconds.

If «Thermostat» is activated for output, «T-mode» string will be shown instead of reset switch; reset in thermostat mode is impossible.

If reset was done manually or by «watchdog» function, «resetting» will be displayed instead of switch; reset will be disabled while resetting.

THERMO
provides thermostat functionality.

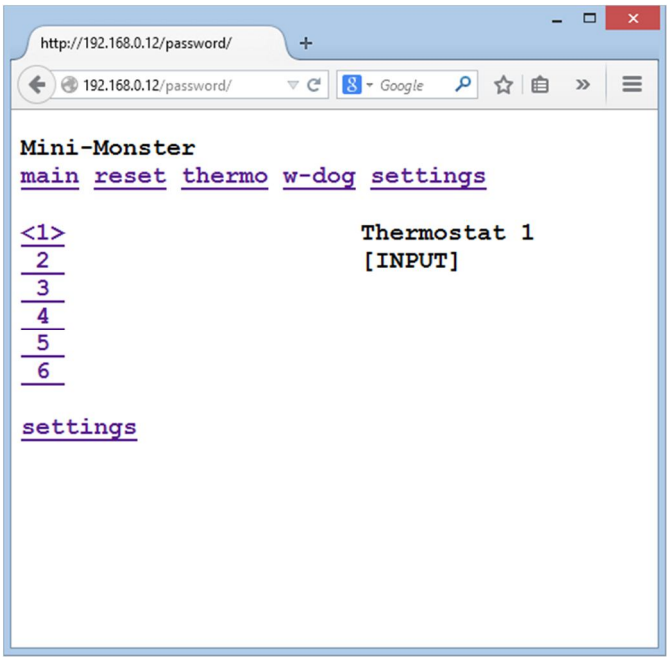
General information:

It's possible to connect up to 6 digital temperature sensors to “Mini-Monster”. Maximum cable length is 50 meters. We don't recommend to use a wire with diameter less than 0.5mm. You can enable «Thermostat» mode for each output of the Module. So, Module will automatically turn ON and OFF that output according to it's settings. Each sensor can be associated with multiple outputs simultaneously with different settings for each output (thermostat).

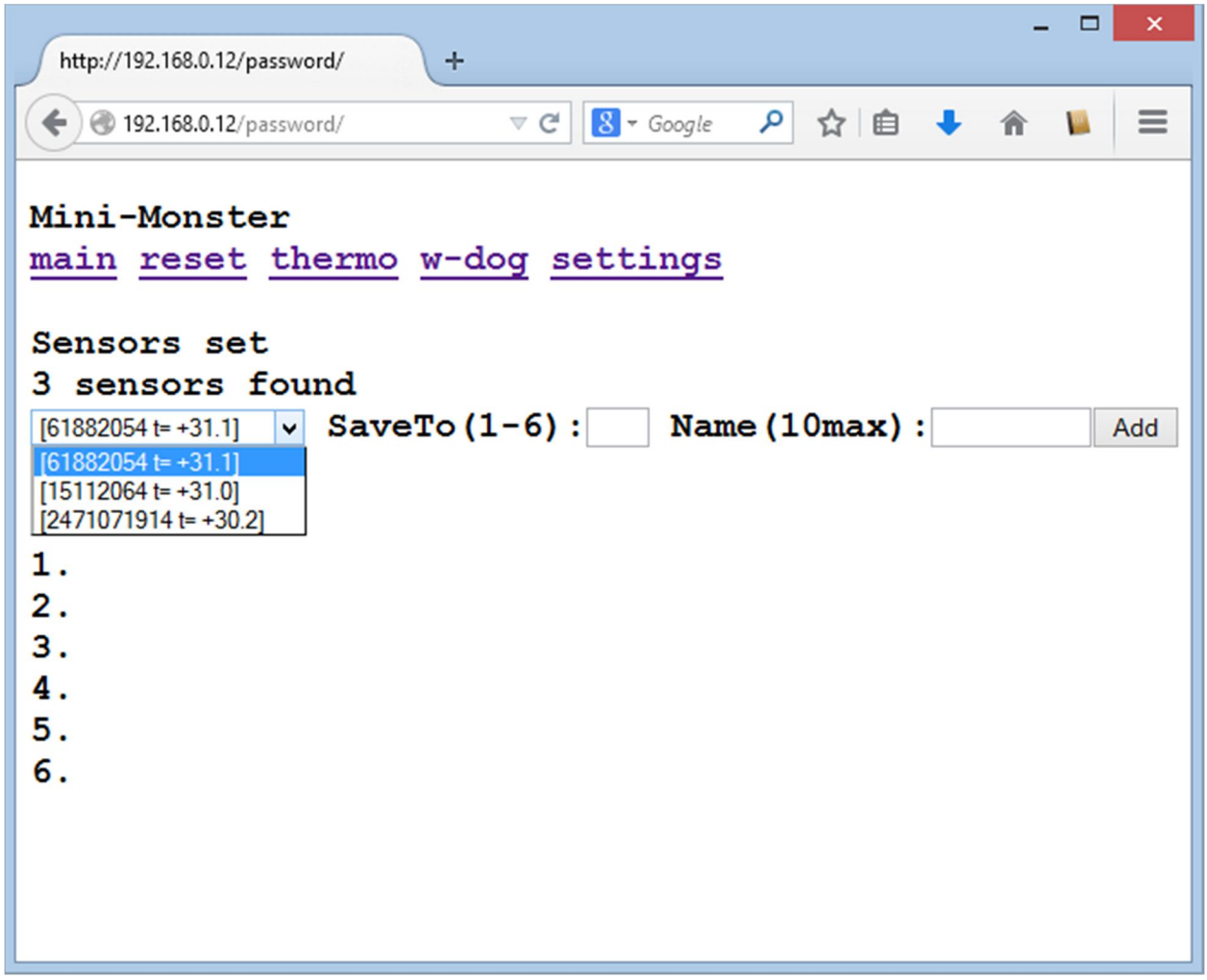
All temperature values here are in Celsius.

Example: Output 1 is controlling main boiler in the house and Output 2 is connected to emergency boiler. Sensor 1 is associated with both of them. Output 1 has 23Co setting and Output 2 has 6 Co setting. So when main boiler is working, temperature in the house is maintained on 23 Co . But in case of main boiler failure when temperature falls below 6 Co, emergency boiler will be started to avoid freezing.

When the Thermostat page is open for the first time you will see the following page. The numerical row on the right represents “Mini-Monster's” ports . You must save found sensors first. The «settings» link below follows to «Sensors search and save» page. Click it.



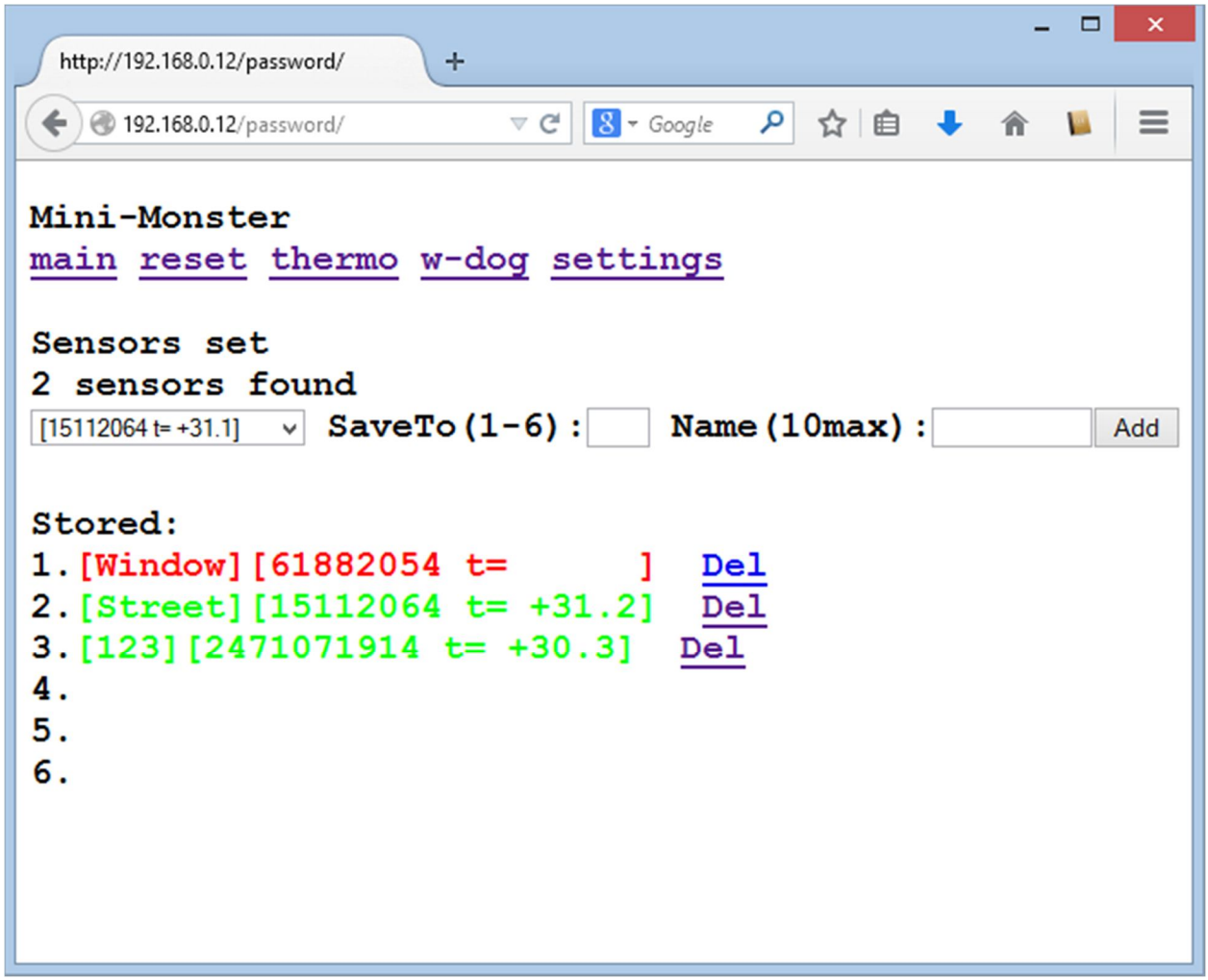
Connect all sensors to the module BEFORE proceeding "Sensor set"

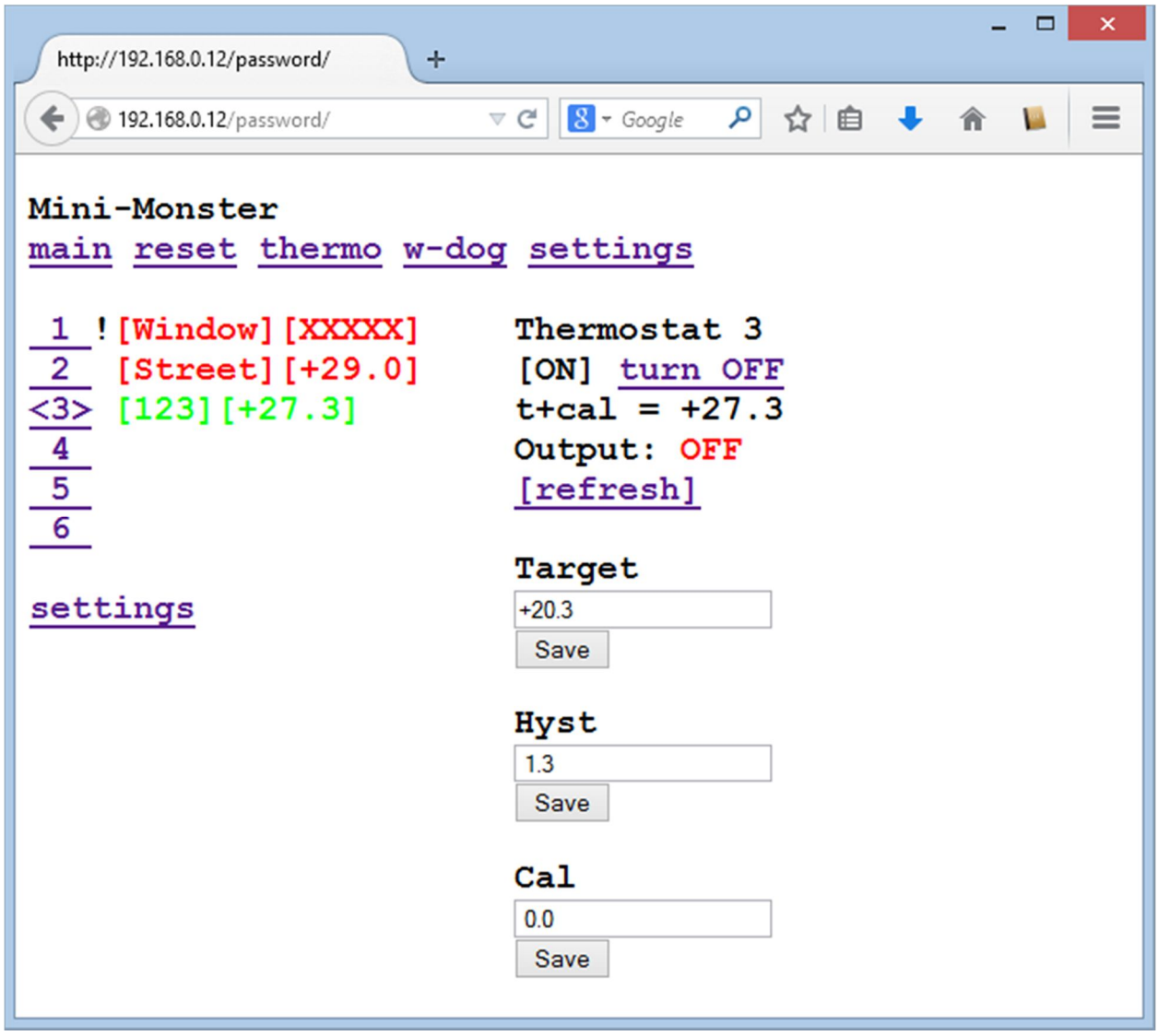


Number under the «Sensors set» label indicates how many temperature sensors are connected to the Module and working properly. There are all 6 sensors connected in this example. In the drop-list you can find all ID's and actual temperature data for each connected sensor.

To save the sensor you must select it in the drop-list, choose saving slot by typing its number to the «Save to» field, and optionally choosing it’s name (10 symbols max). After a while the saved sensor has to appear in the list below. Repeat this operation to save all other sensors you want to use. You can save one sensor multiple times to multiple slots, so saved sensors aren't disappear from the drop-list. You can delete any saved sensor by clicking

«Del» . Saved and active sensors are colored green. If some sensors disconnected or failed after saving, the corresponding lines will be colored red.





After sensors saving routine you can go back to the previews page by «Back» in your browser or using «thermo» link above.

You can see, that the all saved sensors appeared in the list at the right. You can see the name of each thermostat and current temperature readings. This temperature is absolute and hasn't been affected by the calibration value.

By default all thermostats are turned OFF (red color). You can turn it ON by: 1. click on the number of the thermostat you want 2. click «turn ON» to enable thermostat. Enabled thermostats are colored in green.

String «t+cal =» displays the current temperature added with calibration value.

«Output» shows port's current state.

«Refresh» allows you to do manually refresh of the state.

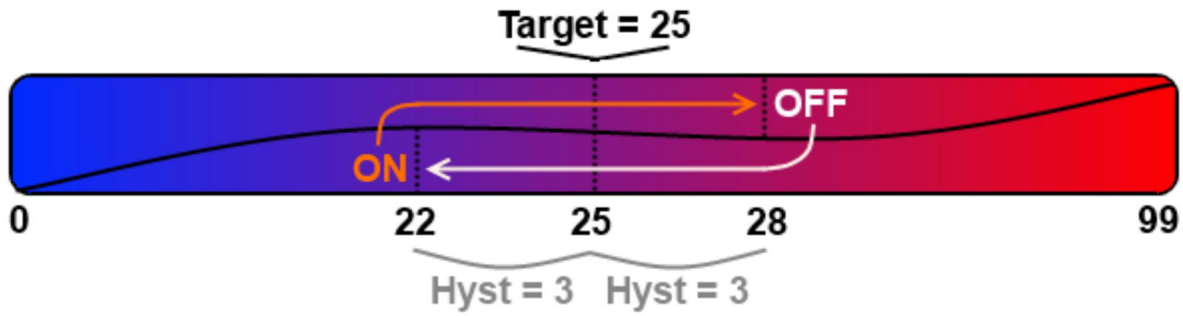
«Target» to set target temperature. Temperature

can be set in both the positive (by default, that is, without the sign of the value

or the «+» sign before the value) and negative (« - » sign before the value)

ranges.To save a given parameter click “Save”.

«Hysteresis» parameter allows to specify a range of operating the output. The value is absolute and unsigned, tenth of a degree. This value will be added to the «Target» when high-threshold will be reached, and will taken away when



the temperature lower threshold will be reached. For example, when temperature of 20 degrees is set, and a hysteresis is set 1 degree, thermostat will switch output ON on 19 degrees and will switch output OFF on 21 degrees.

To save settings click «Save».

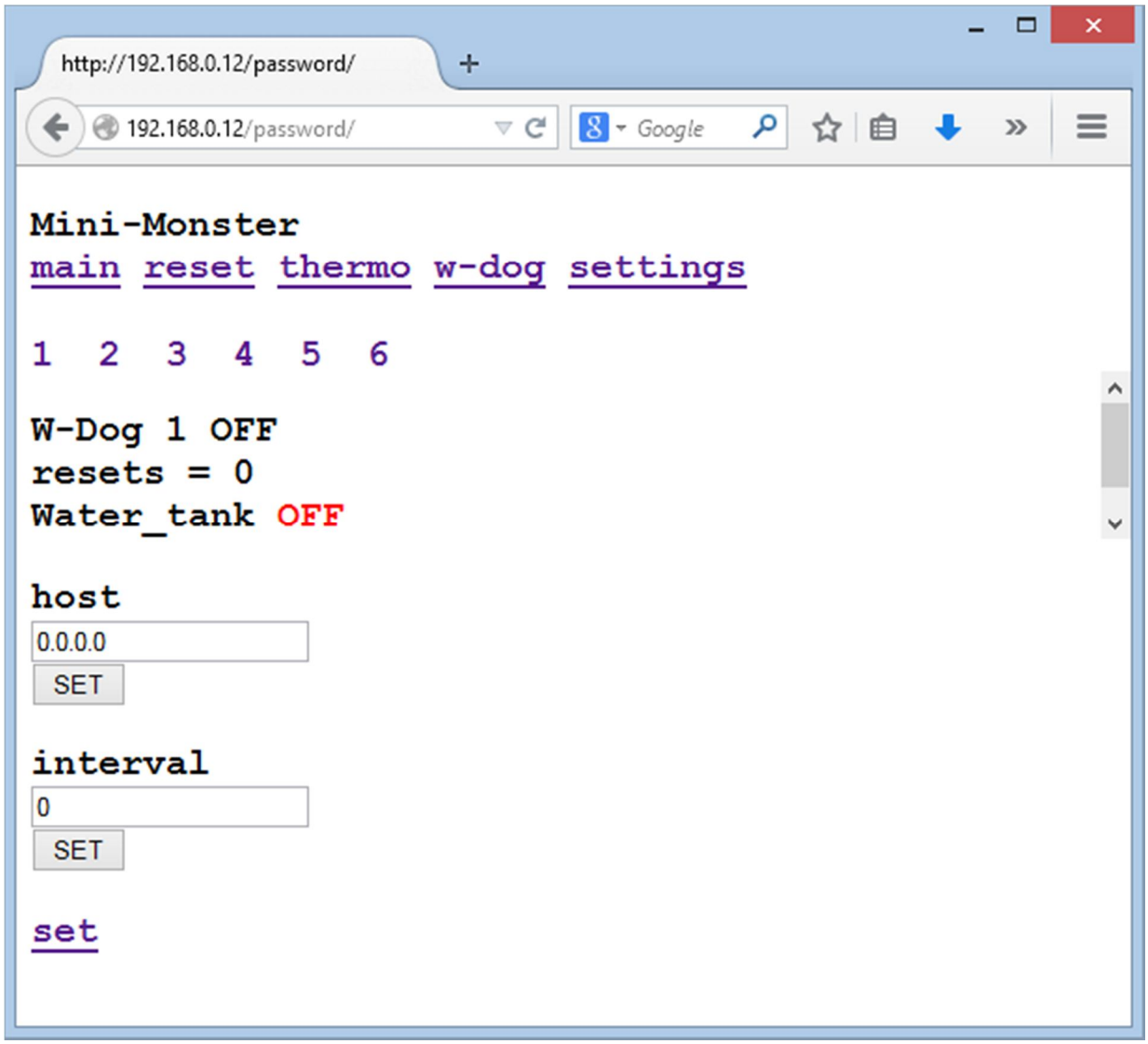
The last parameter allows you to adjust the sensor, as different sensors often has errors (usually linear) within two degrees. This value can be positive or negative. This parameter is always added to or subtracted from the data obtained from the sensor, and the «t+cal» string displays the corrected value. Thermostat also works with temperature corrected by this parameter. If the thermostat is turned ON, the first switch in the MAIN section will be replaced with the inscription «thermo», and manual control of this output will be disabled.

If one of the sensors fails during work of the Module, thermostats associated with it will shutdown. If sensor isn't responding now there will be «XXXXX» mark instead of temperature data.

«!» mark near the name of thermostat's output means that this thermostat was turned OFF because of failure of the corresponding sensor.

It will not turn ON again automatically after if sensor goes back to normal.

Port can't work in «Thermostat» mode and in «Watchdog» mode simultaneously, so when you turn ON the thermostat, the watchdog mode on this port will be turned OFF (if it turned ON) and vice-versa.



W-DOG

provides automatic hardware reset for device wich power consuption is controlled by “Mini-Monster” (by relay connected to the module) in case it is not available in TCP/IP network.

Function provides monitoring and resetting 6 (six) hosts; each w-dog is binded to port same number.

Navigation menu (numbers from 1 to 6 below main menu) provides access to all Watchdogs.

Below navigation menu an informational frame is located. It contains:

info of function itself (is function ON or OFF) – 1st string;

amount resets done by function – 2nd string;

current output state – ON or OFF – 3rd string. If a name was set for output, it will be used; otherwise number will be used.

If target host in unreachable, NR (not reachable) will be added in the 1st string, for example: W-Dog 1 OFF (nr).

On main «W-dog» page you can set address of target machine and interval . availability checking via TCP/IP through the ICMP (PING). You can set checking frequency and additional parameters here.

The function is enabled, if «interval» is non-zero. In this case string of reset statistics («W-dog stat = x») will be added to corresponding port .

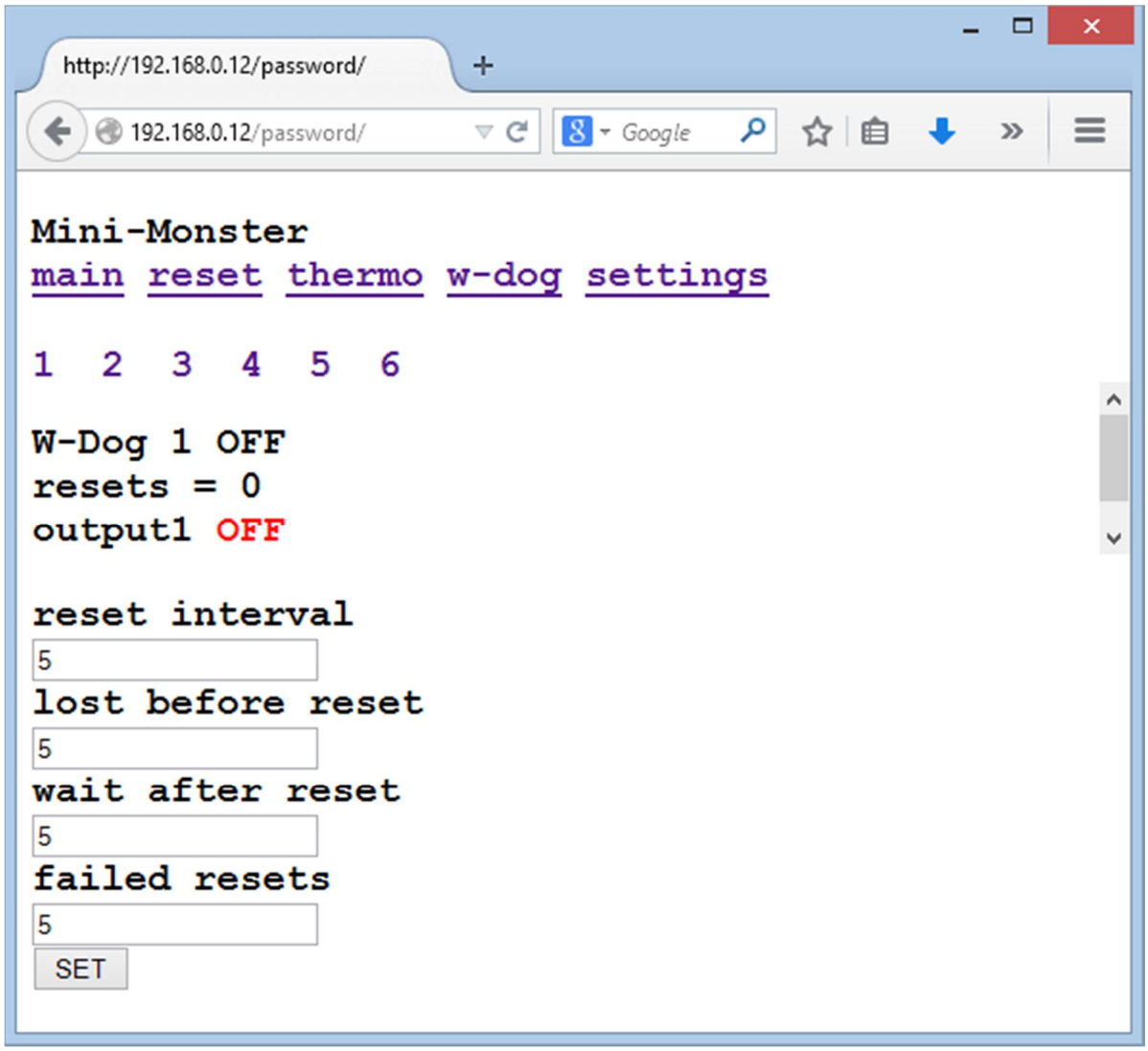
«host» specifies ip-address of the host that will be monitored. The address format is xxx.xxx.xxx.xxx, for example 192.168.10.5. If host is not reachable , «nr» will be displayed in «W-dog» main section, and uppercase «nr» symbol will be displayed in «W-dog» navigation menu.

For monitoring hosts from non-local network, «gateway» option must be used; see «Settings» for details.

If the function is enabled, after the reset section resets statistic will be showed.

«Interval» parameter specifies the time interval in seconds after which the availability check will be done. The range of values is from 1 sec. to 255 sec. 0 means deactivating the function.

To set another parameters, use «set» item.



«Reset interval» parameter specifies the time (in seconds) between switching output off and on (power-on reset). Can be set from 1 second to 255 sec., recommended for at least 2 seconds.

«Lost before reset» parameter determines the number of packets lost (no response for a request to the host)before the reset will be performed. For example, if «Ping interval» = 2, and «lost before reset» = 4, then reset will be done in 2 * 4 = 8 seconds if no response from the host was got in this eight seconds. If at least one response is received, the no-response-counter will be set to zero. The parameter can have a value from 1 to 255 seconds.

«Wait after reset» parameter determines the check delay after reset. For example, if the computer is rebooted, it will be available in the network after approximately 2-3 minutes. At this time, computer will be inaccessible from network, and checking is useless. The parameter can have a value from 1 to 255 seconds.

«Failed resets» parameter determines how many times the equipment can be resetted if the answers are not received after the restart. After the specified number of restarts, if there will be still no response from the host, Watchdog function will be disabled. The value can be from 1 to 255.

Important:

if more than 1 (one) host is monitored, we do not recommend using values of parameters less than: interval – less than 3 (three) seconds; lost before reset – less than 3 (three); wait after reset – less than 3 (three) seconds.

If not recommended values are used, web-interface may not function properly and large delays in web-pages loading process are possible. It will not affect proper functioning of watchdog function itself.

SNMP

From firmware version 2.5 “Mini-Monster” supports SNMP protocol v.1 (RFC 1155, RFC 1157).

This function can be enabled in “Settings”.

GET and GETNEXT request types are supported. The Module has all its data in «Enterprise» space.

“Mini-Monster”'s Enterprise OID–43 (1.3.6.1.4.1.43)

Community string is the same as password to Module's web-interface.

Information that can be obtained from the Module by SNMP:

0. device_id – Module's name, oid 0, «String» format;

1-6. Module's output status, oid 1-6 (corresponds to output number), «integer» format, syntax: 1 – ON, 0 – OFF;

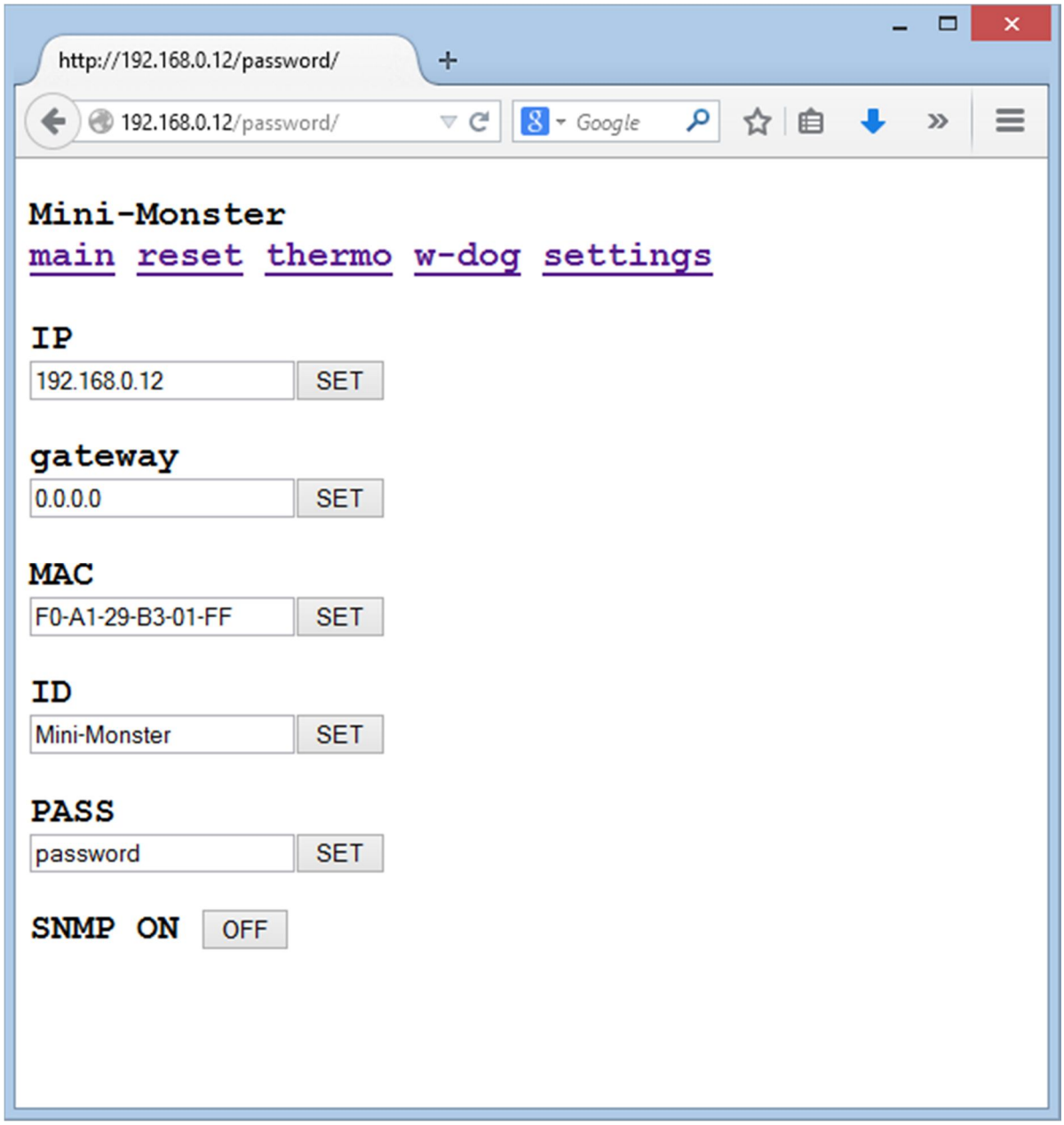
7-12. Watchdog reset stat, oid 7-12 (corresponds to Watchdog function number), «integer» format;

13-18. digital thermosensor temperature, oid 13-18 (corresponds to thermosensor number), «singed integer» integer, must be divided by 10;

19. analog thermosensor temperature, oid 19, «signed integer», must be divided by 10;

MIB's can be found at http://mini-monster.ru/index.php/en-US/dwnld-en.

SETTINGS



common module settings

«IP» specifies an IP address of the module in a local network. Default address is 192.168.0.12.

«Gateway» specifies a gateway in local network to allow monitoring of hosts that are located in another networks. Address format is xxx.xxx.xxx.xxx, for example 192.168.10.1.

«MAC» specifies a unique module's physical MAC address . Change only if necessary. Default – F0-F1-09-E4-01-FF.

«ID» specifies a name (just a label) of the module. Default is «Mini-Monster».

«Pass» is a password to the module. Default is «password».

FW ver string indicates current firmware version.

§ 5. Mini-Monster 32NF modification peculiar properties

1. **Firmware change and update**

   Can be done using special software (can be found at http://mini-monster.ru/index.php/en-US/dwnld-en). To activate software change mode click «**change firmware**» in «Settings».

2. **Factory reset**

   Full software reset can be done if main firmware is not working properly for some reason. To do so, connect «factory reset» pins for 5 (five) seconds while turning Module ON. To simple reset settings on 32NF modification, connect «factory reset» pins for 1 (one) second while turning Module ON.

3. **Limited functions set**

   For technical reasons, 32NF modification can have slightly less software functions simultaneously than 32N.

All other parameters of 32NF modification are identical to 32N.

§ 6. Miscellaneous

«Mini-Monster32N» can output its state in JSON format. Format of the JSON query is: http://192.168.0.12/password/?js=

Answer is: {"fw":"MM32N v2.1 std b200714", "id":"Mini-Monster", "prt":[0,0,0,0,0,0], "pst":[0,0,0,0,0,0],"t":[23.4,25.1,39.2,"No sensor","No sensor","No sensor"],"wdr":[0,0,0,0,0,0]}, where:

- fwv – firmware version;

- id – module's name;

- prt – port state [array];

- pst – I/O: 1 – OUT, 0 – IN [array];

- t – temperature [array];

- wdr – watchdog resets [array].

Settings of the module are stored in non-volatile (EEPROM) memory, so after the power settings they will be preserved. All the data is stored in EEPROM of the Module except Watchdog function statistics.

To reset the module to the factory defaults, connect the pads when turning the Module on (see Section 3).

We do not recommend to use the module at temperatures below +0 ° C and above +40 ° C. The module was not long tested at these temperatures. If exploitation for the temperature measurement in not-recommended temps is needed, you may use an extension cord to connect the temperature sensor.